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CPA240 Power Amplifier Manual: V1.31

CPA240 Configurable Power Amplifier

Revision History

Version	Modifications	Date
1.0	CPA240 Configurable Power Amplifier	15/7/03
1.1	Safety information	17/12/03
1.2	D805 bus adapter card and additions	14/04/04
1.3	Add figures	22/03/05
1.31	Outputs not inputs in table 13.2	27/10/05

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DISCLAIMER

This manual contains information that is correct to the best of Audix Systems knowledge. It is intended to be a guide and should be used as such. It should not be considered as a sole source of technical instruction, replacing good technical judgement, since all possible situations cannot be anticipated. If there are any doubts as to exact installation, configuration and/or use, call Audix Systems at +44 (0)1799 540888

ACKNOWLEDGEMENTS

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CPA240 Configurable Power Amplifier

Models Covered

This user manual covers the following equipment

- CPA240 Power Amplifier

Technical Support

Should you require technical assistance regarding the CPA240 Power Amplifier or any other Audix Systems product please contact our Technical Services Department.

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CPA240 Configurable Power Amplifier

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APPENDIX A ; Amplifier Fail Disable (PA Only)

CPA240 Configurable Power Amplifier

1 Specification

1.1 Specification

Audio	CPA240 Power Amplifier	
Power amplifier channels	4 (configurable)	
Maximum Power	240 watts (1kHz @ 100V r.m.s)	
Amplifier power configurations (switchable)	4 x 60W	
	1 x 120, 2 x 60W	
	2 x 120W	
	1 x 180, 1 x 60W	
	1 x 240W	
Power amplifier channel enable	Channel on/off (unused channel power save)	
Frequency Response (-3dBu)	70Hz to 20kHz	
Distortion (1kHz at rated power)	Better than 1% THD	
Cross-talk	Better than –60dB	
Signal/Noise (20Hz-20kHz rel to 100V)	Better than –85dBu	
Sensitivity (100V output)	0dBu (+10dBu link option)	
Volume control range	0 to –50dB	
Power Supply:		
Mains supply (V)	230V AC. +/- 10%, 50-60Hz switch options	
Backup supply input	24V DC (nominal). To be fused at source 25A max.	
Power Consumption max 4 x 60W	510W	
<i>Amplifier idle & quiescent consumption</i>	<i>Idle</i>	<i>Quiescent (wakeup)</i>
1 x master channel configured	121mA	1180mA
2 x master channel configured	146mA	1210mA
3 x master channel configured	171mA	1250mA
4 x master channel configured	195mA	1260mA
General:		
Heat Dissipation max (W)	270W	
Dimensions(length, width, Height in :mm)	19” Rack Width 2 U High (89mm x 480mm x 370mm)	
Weight (kg)	15 kg	
Operating temperature range (°C)	0°C to 40°C	
Humidity range	90% non condensing	
Standards	Meets or exceeds the requirements of BS5839.	
	Compliant with EMC standards, EN 61000-6-1-2000, EN 61000-6-3-2001	
	Compliant with LVD safety standards; BS EN60065:1998	
Fusing:		
Mains fuse rating	1 off 20 x 5mm T 4A H	
Battery fuse rating	1 off automotive blade F 25A	
Amplifier output stage fuse rating	4 off 20 x 5mm T 6.3A	

CPA240 Configurable Power Amplifier

1.2 Battery Consumption

Amplifier power consumption during a mains failure can be calculated by the duration the amplifier remains at standby plus the additional power drawn during its operation.

1.2.1 Standby Consumption

The table below details the amplifier battery standby consumption for the four possible master/slave configurations.

Standby consumption is the power used by an idle amplifier during a mains power failure. During a mains failure voice alarm systems are generally expected to provide 24 hours of standby and ½ hour of alarm broadcast. Figures for 72-hour standby operation are also provided.

It is important that all unused channels are configured as slaves as this reduces battery consumption to a minimum i.e. an amplifier driving a 60watt load should be configured as a 240W

Amplifier channel configuration	Consumption/hour	24 hours total	72 hours total
1 x master channel configured	140mA	3.38A	10.10A
2 x master channel configured	166mA	3.99A	11.95A
3 x master channel configured	192mA	4.61A	13.82A
4 x master channel configured	216mA	5.18A	15.55A

1.2.2 Operational Consumption

The operational power consumption of an amplifier is effected by a number of factors:

- Speaker load
- Broadcast level
- Signal type

Where the speaker load connected to the amplifier is less than its maximum rated power, the proportion of power drawn will be reduced. Similarly the level and signal or message type used during an alarm broadcast can also reduce power consumption. Where a continuous signal is employed, the consumption can be approximately calculated by the signal voltage across the load.

However voice alarm broadcasts often contain tone and voice signals. Due to the nature of a voice messages and the gaps of silence that generally separates the alarm tone and voice signal the overall average consumption is further reduced.

Generally with normal site perimeters and a combined tone and voice alarm power consumption would be 33% of the maximum.

Figures below indication the power consumption of an amplifier during nominal and fully power conditions.

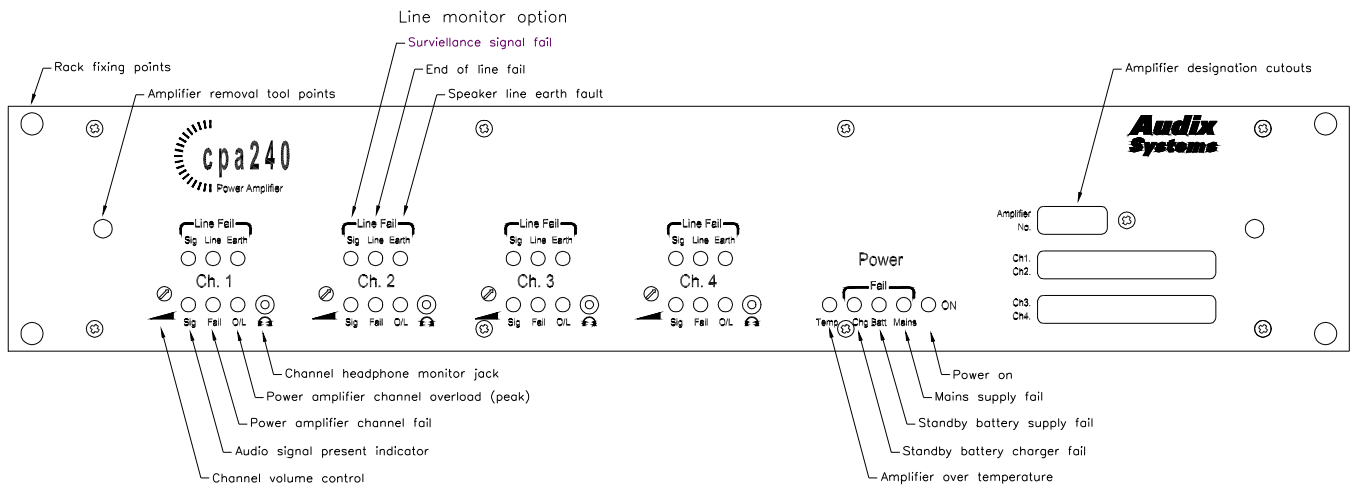
Amplifier total load	33% consumption	Nominal power requirement (33% for ½ hour)	Continuous tone at 100V into a full load
60W	1.7A	0.9A	5.0A
120W	3.3A	1.7A	10.0A
180W	5.0A	2.5A	15.0A
240W	6.7A	3.3A	20.0A

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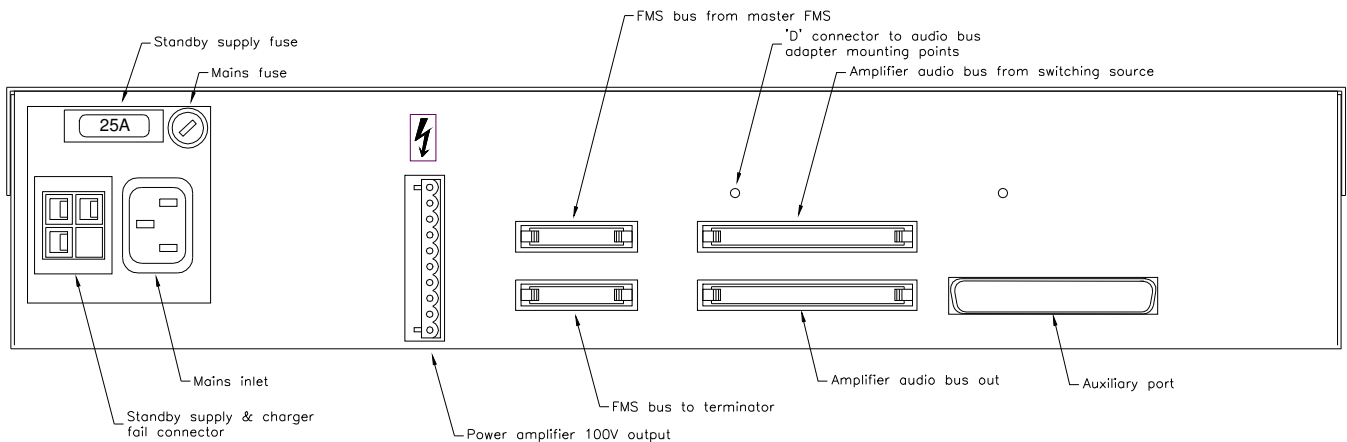
The 'nominal' power consumption figure must not be used if a continuous tone alarm is employed.

2 Description

2.1 Front View



2.2 Back View



CPA240 Configurable Power Amplifier

2.3 Brief Description

The CPA240 power amplifier provides up to four channels of amplification for both public address and voice alarm applications.

The 100-volt line output stages are robustly designed and are protected against open circuits and loads that exceed the channel's rated power, including short circuits.

A thermal shutdown circuit provides further protection of the amplifier's output stages.

The amplifier is equipped with a number of features that reduce system engineering and assembly times.

An amplifier audio bus replaces previously hand-wired input cabling with a sixteen 'zone' or 'destination' ribbon cable.

A link matrix located within the amplifier allows the selection of a single 'zone/destination' from the ribbon bus to each amplifier channel i.e. an amplifier channel may be configured to any one output of the switching matrix.

Where the ribbon bus cannot be used due to special wiring requirements the auxiliary port 'D' type connector allows solder type connection to be made.

Selector switches within the amplifier chassis set the master or slave configuration of each channel amplifier providing a range of power settings:

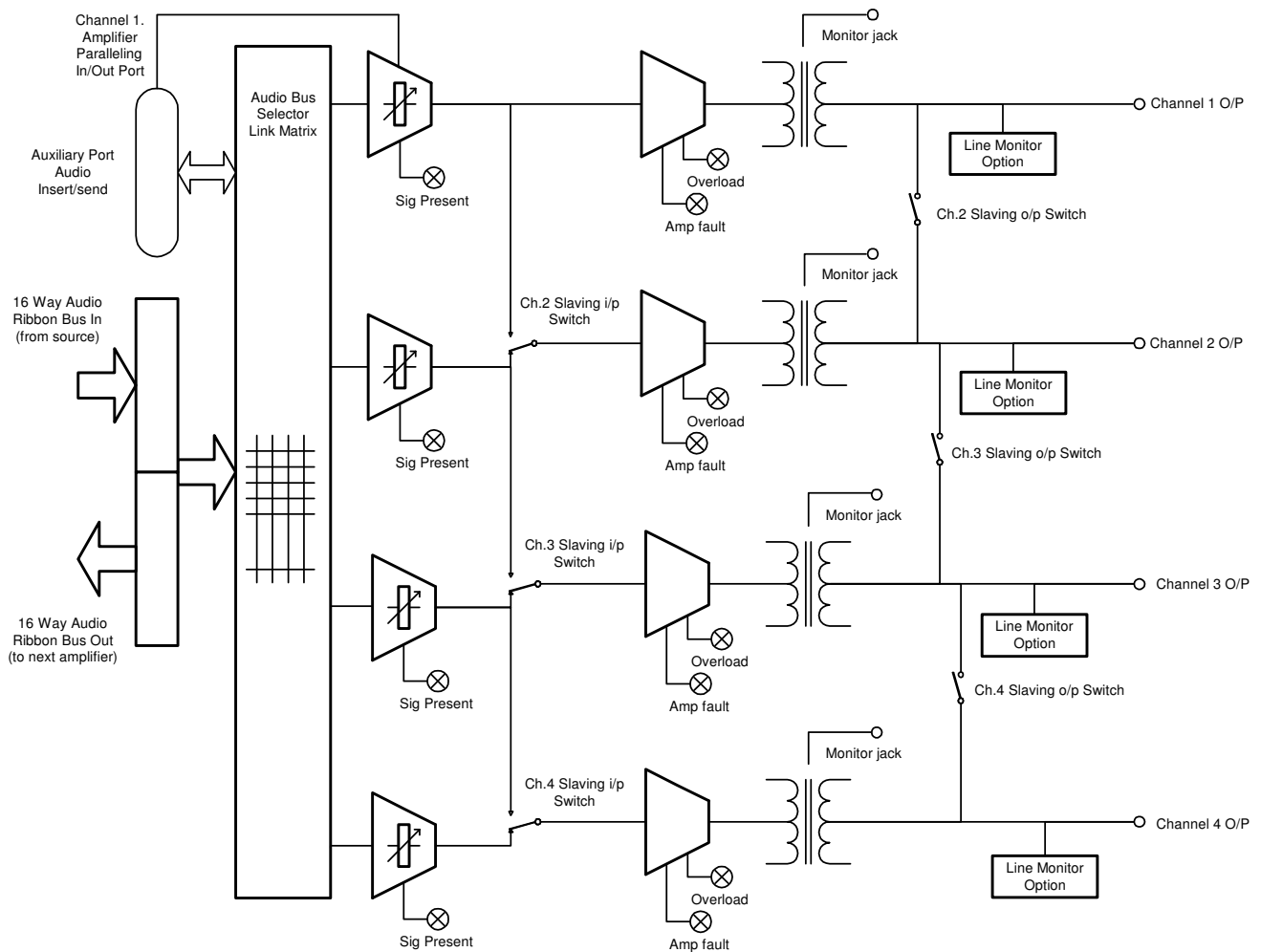
- 4 x 60 Watt
- 1 x 120 Watt & 2 x 60 Watt
- 2 x 120 Watt
- 1 x 180 Watt & 1 x 60 Watt
- 1 x 240 Watt

Paralleling amplifier chassis is achieved by connecting the parallel output on the auxiliary port to the slave amplifiers. The volume control of the 'master' amplifier overrides the volume controls of the paralleled slaves.

CPA240 Configurable Power Amplifier

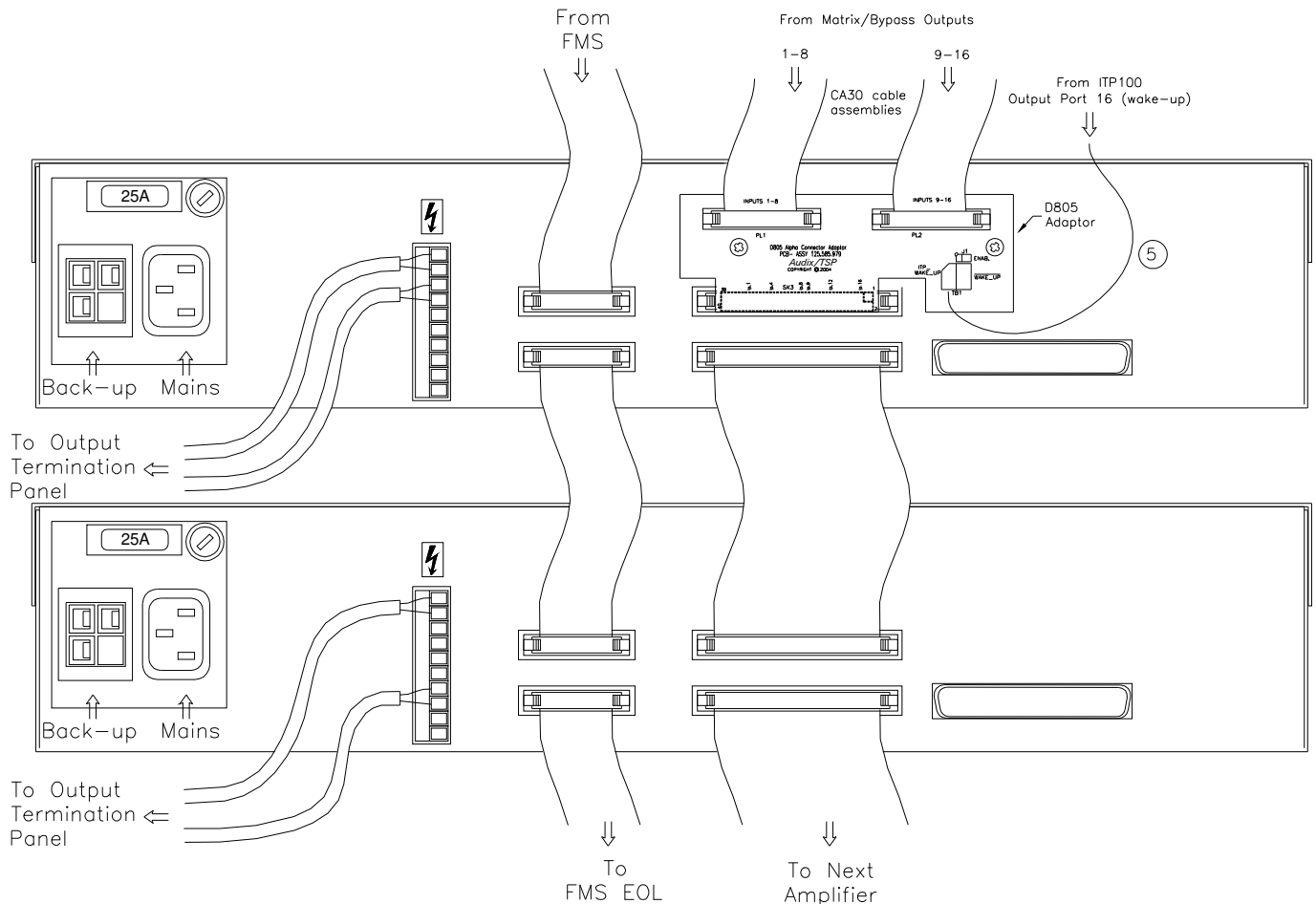
3 Amplifier Features

3.1 CPA240 Simplified Block Schematic



CPA240 Configurable Power Amplifier

3.2 Connections



Schematic shows a typical system connection with D805 audio bus adapter card to convert matrix controller 'D' type cables to the CPA240 audio bus (see Audio Bus Adapter section). The subsequent amplifiers controlled by that matrix are then connected via the 40 way audio bus cables. A wake-up connection is also shown.

The upper amplifier is shown with output channels 1 & 2 in use. This would correspond to 2x60W or 1x60W + 1x120W or 1x60W + 1x180W configurations.
The lower amplifies output channel wiring corresponds to a 1x180W + 1x60W configuration.

The CPA240 amplifier is supplied with a one metre IEC plug to socket Mains flex and a battery connector kit (see Back-up supply connector section for wiring and assembly details).

CPA240 Configurable Power Amplifier

3.2.1 Amplifier Audio Bus

The amplifier audio bus provides a means by which 16 matrix outputs or destinations such as those provided by the Alpha matrix controller can be connected simply to CPA240 amplifiers within an equipment rack or suite.

Each amplifier is supplied with a single 40way-ribbon cable.

The cable is connected from the amplifier audio bus input connector to the switching matrix (where the amplifier is adjacent to the matrix) or to the previous amplifier's audio bus output connector.

With the 16 matrix destinations essentially daisy chained to each amplifier an internal selector matrix allows a single matrix destination to be connected to an individual amplifier channel.

3.2.2 Audio Bus selector

The audio bus selector enables an amplifier channel to be configured to a single matrix destination or zone connected via the audio bus.

The audio bus selector is located inside the amplifier chassis on the D804 connection card.

3.2.3 Auxiliary Port - Direct Audio Input

Alternative means to connect audio sources to the amplifier is provided by the auxiliary port.

The 'D' type plug and socket arrangement allows bespoke cabling to be connected via solder joints.

3.2.4 Auxiliary Port - Insert

In addition to the direct audio input connections, the auxiliary port provides insert points for each amplifier channel.

This allows signal processing equipment to be connected or 'inserted' into the input of the amplifier whilst retaining the efficiencies offered by the audio bus connection system.

The audio bus selector provides additional connection points for 'insert' configuration.

3.2.5 Auxiliary Port - Amplifier Linking

CPA240 power amplifiers can be connected in a parallel group to provide power for loads greater than 240Watts. These connections are made using the auxiliary port. See 'Amplifier Configuration'.

3.2.6 Amplifier Output

The amplifier output plug and socket assembly provides screw terminals for four 100V loudspeaker circuits and monitoring zero volt connections.

The screw terminals allow conductors of up to 2.5mm² to be connected.

Warning, high voltages exist on these terminals.

CPA240 Configurable Power Amplifier

3.3 Amplifier Circuitry

3.3.1 Input Stage

A four channel balanced input stage provides drive to the amplifier's power stage. The gain of each channel can be adjusted via the front panel volume controls. Signal present and overload LEDs provide signal status indication for each channel. The signal present LED also indicates amplifier 'wakeup'.

3.3.2 Power Stage

The amplifier power stage is designed as a removable heatsink assembly, which allows for quick assembly and access to specialised settings. This power block assembly includes four 60Watt power stages and input 'master'/'slave' switching.

3.3.3 Amplifier Protection

The amplifier's output stages are protected against both open circuits and loads that exceed the channel's rated power, including short circuits. A non-latching thermal shutdown circuit provides protection against damage to the output stage due to overheating. The front panel 'Temp' LED indicates amplifier over temperature. Ultimate protection of the MOSFET power devices and the power supply is provided by individual 6.3AF channel fusing.

3.3.4 Amplifier Surveillance, Low Power Idle & Wakeup

In an attempt to reduce standby battery usage to a minimum, in normal operating mode the amplifier shuts down when not in use.

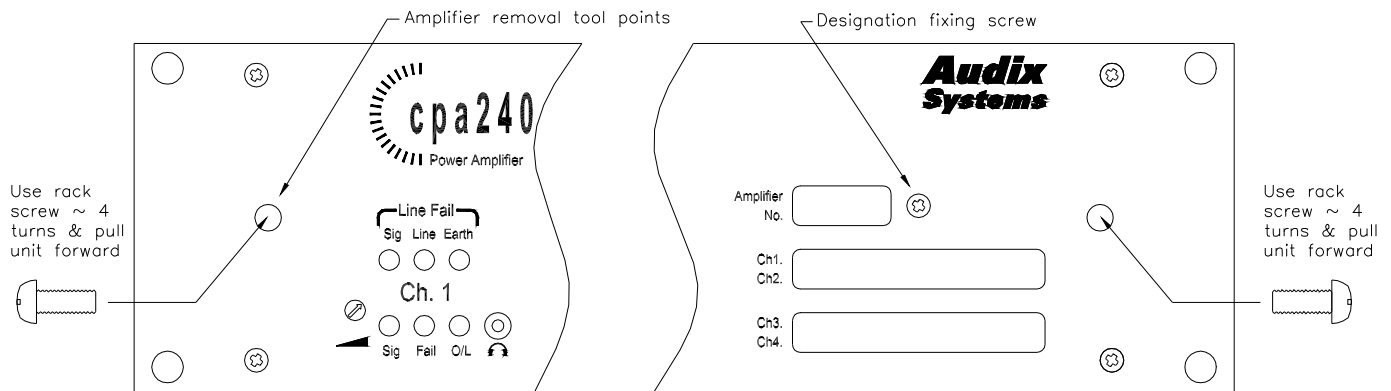
To allow continuous and reliable monitoring of the amplifier and loudspeaker lines the amplifier is periodically enabled or 'Woken up'. The 'wake up' signal is provided by the matrix controller approximately two seconds before the matrix routes the 20kHz surveillance pulse. This allows adequate time for the amplifiers power stage to reach its normal operating quiescent condition. Once the surveillance signal has passed through the system the 'wake up' signal is removed. The surveillance procedure is repeated every 30 seconds.

If required the low power mode can be disabled. See advanced configuration.

CPA240 Configurable Power Amplifier

3.4 Amplifier Designation & Removal Aid

The CPA240 front panel features both removal aid points and designation cut outs. The designation feature allows a cost effective printed paper label to be fitted to the amplifier without glues or tapes. See method statements below:



Amplifier Removal Aid

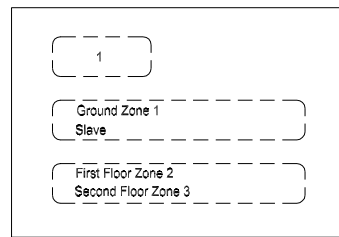
The CPA240 amplifier features two captive nuts that may be used as a removal aid.

To pull the amplifier from its mounting position in the equipment rack, screw two of the M6 rack fixing screws into the removal points approximately four turns.

Note: The screw must not be tightened as the captive nut is blind and thread damage will result.

With both screws in place, grip the screw head with thumb and forefinger and slide the amplifier forward. Only move the amplifier far enough forward so that the chassis can be grasped.

THE REMOVAL AID MUST NOT BE USED TO LIFT THE AMPLIFIER.



Fitting Amplifier Designations

1. Complete a designation label such that the charters line up with cutouts provided. (Paper label can be used)
2. Loosen the amplifier front panel screws
3. Remove designation fixing screw
4. Slide label up between the front panel and chassis into position
5. Push designation fixing screw into position puncturing the label. tighten all screws

CPA240 Configurable Power Amplifier

3.5 Audio Bus Adapter

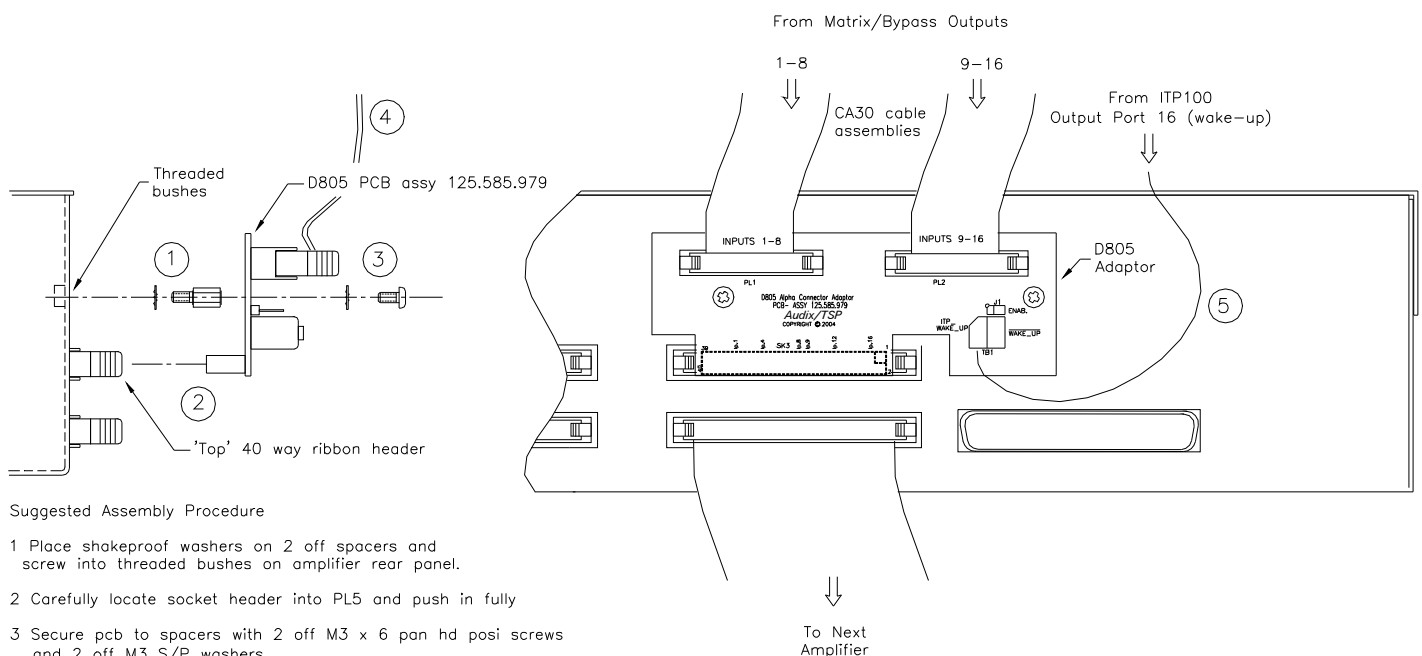
The Audio Bus Adapter provides a conversion between the two output 'D' type connectors on the Alpha matrix controller or V32EBPU bypass unit, and the single 40 way ribbon connector bus of the CPA240 amplifier.

One adapter card is required per matrix controller and is to be mounted on the first amplifier to which that matrix is connected.

The kit also includes two CA30 ribbon cables that connect from the adapter card ribbon header to the 'D' type plugs.

Screw terminals, on the adapter card provide a connection for the amplifier 'wake up' signal where used (options of positive and negative switching is available).

3.5.1 Wiring and Assembly Detail



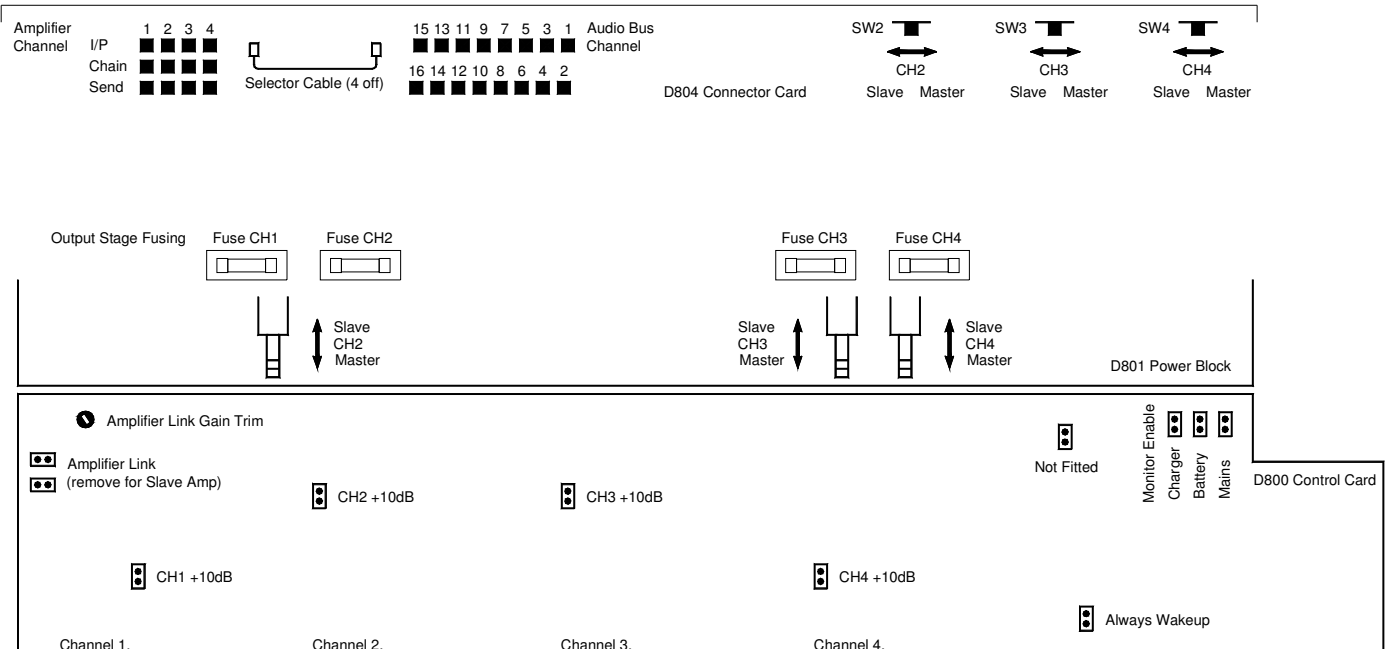
Suggested Assembly Procedure

- 1 Place shakeproof washers on 2 off spacers and screw into threaded bushes on amplifier rear panel.
- 2 Carefully locate socket header into PL5 and push in fully
- 3 Secure pcb to spacers with 2 off M3 x 6 pan hd posi screws and 2 off M3 S/P washers
- 4 Connect cable assemblies CA30 to headers PL1 & PL2
(Connect CA30 'D' connectors to signal source i.e. Alpha or Bypass unit)
- 5 Connect wake-up signal to TB1 (for Alpha systems the normal connection would be from 'ITP100', 'Switch out 16' to D805 TB1 terminal 1 'ITP wake-up')

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4 Amplifier Configuration

4.1 Internal Selector View



4.2 Master Slave

The CPA240 amplifier is equipped with four individual 60-Watt channels. Setting of the 'master/slave' selectors allows the channels to be paralleled, providing 60, 120, 180 & 240 Watt configurations.

There are two 'master/slave' selectors per channel they are located on the Power Block (D801) and rear connector card (D804). 'CH2' selects channel 2 as a master or slave etc.

Note: Both switches on a channel MUST be set to the same position.

When wiring to a paralleled amplifier the input and output signal cabling is to be connected to the master channel only.

4.2.1 Master Slave Configuration Examples

4 x 60 Watt.

- Set all Master/Slave switches to 'master' (factory setting).
- Wire/configure channel 1 input/output signals to amplifier channel 1 etc.
- Wire/configure channel 2 input/output signals to amplifier channel 2 etc
- Wire/configure channel 3 input/output signals to amplifier channel 3 etc
- Wire/configure channel 4 input/output signals to amplifier channel 4 etc

2 x 120 Watt.

- First amplifier group: Set CH2 M/S switch to 'slave' (this parallels channel 2 to channel 1 master).

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- Second amplifier group: Set CH3 M/S switch to 'master' and CH4 to 'slave' (this parallels channel 4 to channel 3 master).
- Wire/configure first amplifier group input/output signals to CH1 (master).
- Wire/configure second amplifier group input/output signals to CH3 (master).

1 x 240 Watt.

- Set all Master/Slave switches to 'slave' this parallels channels 2, 3 & 4 to channel 1 master
- Wire/configure channel 1 input/output signals to amplifier channel 1 etc.

4.3 Audio Bus Selector

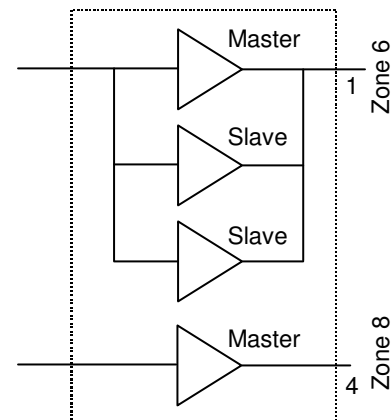
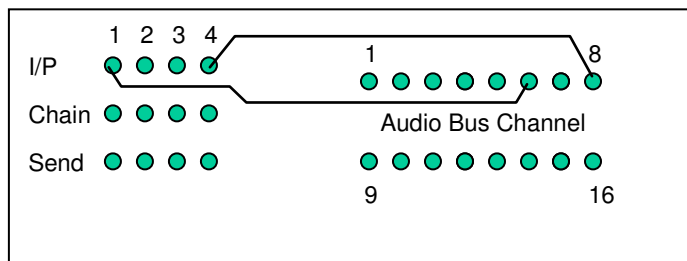
The Audio Bus allows an amplifier within a system to be connected to a switching matrix such as an Alpha and/or other CPA240 amplifiers via a ribbon cables. These ribbon cables couple the sixteen matrix outputs (destinations or zones) to the audio bus channel pin headers located on the D804 connector card within the amplifier.

Configuring each amplifier master input channel involves linking the desired Audio Bus channel (matrix zone) to the amplifier input channel using one of the four two way selector cables supplied.

Note: See advanced configuration for:

- Connecting two or more input channels to the same Audio Bus 'zone' within a single amplifier (Chain).
- Connecting (inserting) external signal processing equipment (Send).

4.3.1 Audio Bus Selector Configuration Examples



Connecting matrix zone output 6 to amplifier channel 1 (180W)

- Connect one end of the two way selector cable to header 6 of the Audio Bus Channel
- Connect the remaining end to Amplifier Channel 'I/P' header 1
- First amplifier group: Set CH2 & CH3 M/S switch to 'slave'.
- Wire/configure first amplifier group input/output signals to CH1 (master).

Connecting matrix zone output 8 to amplifier channel 4 (60W)

- Connect one end of the two way selector cable to header 8 of the Audio Bus Channel
- Connect the remaining end to Amplifier Channel 'I/P' header 4
- Second amplifier group: Set CH4 M/S switch to 'master'
- Wire/configure second amplifier group input/output signals to CH4 (master).

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4.4 Fault Monitoring Settings

The amplifier provides fault indications for its power sources.

- Mains
- Battery (backup supply)
- Changer

These fault indications may be disabled by removing the appropriate link located on the D800 control card.

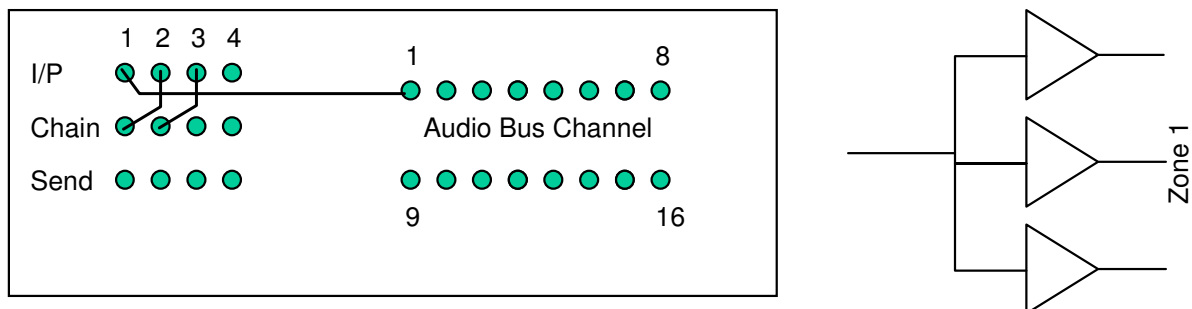
5 Advanced Configuration

5.1 Chain Feature

Each channel is provided with an additional header at its input so that another input channel may be connected to it.

The feature allows a 'zone' connected to an input channel to then be 'Chained' to a second input channel.

This can then be repeated for the other channels if required.



Example shows connection of amplifier inputs 1, 2 & 3 to Zone 1. Amps 1, 2 & 3 will be set as Masters.

5.2 Connecting Signal Processors 'Insert' ('Send')

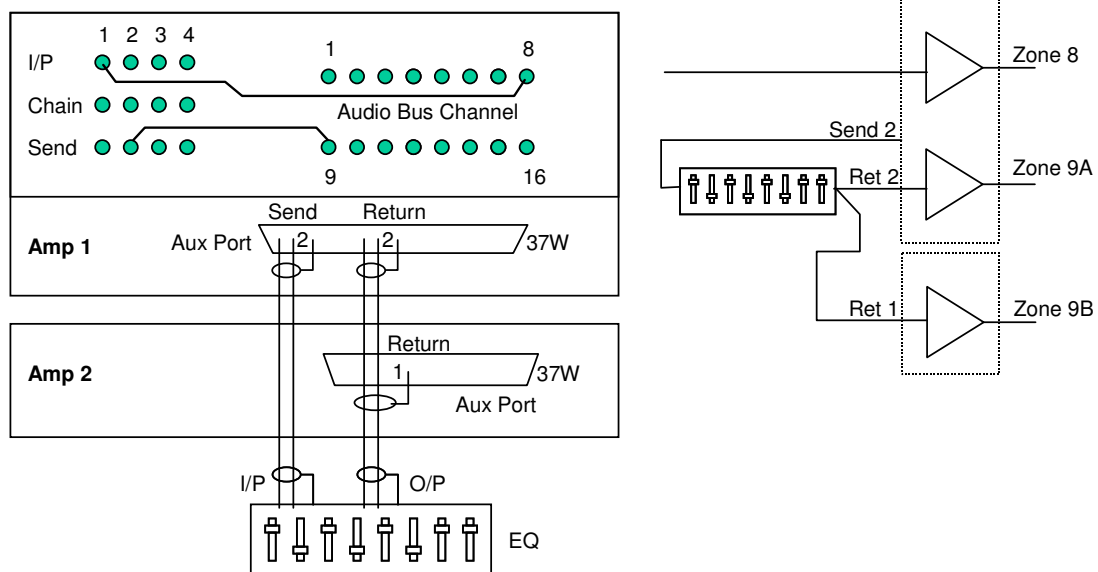
Additional signal processing equipment can be connected into the audio bus – amplifier path.

This is achieved by using a selector cable to connect the required audio bus 'zone' to the appropriate channel 'Send' (**Do not connect to the 'I/P' header**).

This will route the selected audio bus zone to the auxiliary port connector 'Send' output terminals.

The input of the signal processing equipment can then be wired to this output. The output of the signal processing equipment can then be wired back into the amplifier signal path via the 'Direct Audio Input' connections.

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Example shows connection of amplifier input 1 to direct to Zone 8 and input 2 to Zone 9A/9B via a Graphic EQ and 37W aux port.

Note: Shorting the 'Send' signal path will significantly reduce the signal level on the audio bus 'zone'. This will in turn affect all equipment connected to this 'zone'.

5.3 Volume Control Gain Option

The nominal gain of the amplifier with the volume controls set to maximum is +42dB (0dB i/p – 100V o/p). An additional 10dB gain for each channel is available by fitting the 'CH+10dB' link.

Links for each channel:

- CH1+10dB
- CH2+10dB
- CH3+10dB
- CH4+10dB

The link headers are located on the D800 control card (lower front).

5.4 Linking Amplifier Frames (Parallel Group)

The CPA240 provides an amplifier linking or grouping facility via additional circuitry and the auxiliary port connector. This allows a group of amplifiers to be paralleled giving increased power to a speaker circuit i.e. paralleling 3 x 180 Watt amplifiers could drive a 540 Watt speaker circuit.

The maximum permitted amplifier group is five frames i.e. up to 1200Watts

General configuration:

- One amplifier within the group is set as a 'controller' the other as 'slaves'.
- Only channel 1 of the amplifier is 'linked' while the other channels are configured as slaves (to required power) see 'master/slave' section.
- Only channel 1 volume control of the control amplifier adjusts the group level.
- The output of each amplifier within the group is paralleled using the speaker circuit output cable (manually wired).
- All amplifiers within a group must have the same power configuration i.e. 180 Watts
- All amplifiers within the group must be adjusted to have an identical power output.

CPA240 Configurable Power Amplifier

- Each amplifier within the group must be connected together via the 'link' feature.

CPA240 Configurable Power Amplifier

5.4.1 Wiring Grouped Amplifiers

Input Wiring

Each amplifier within a group should be 'linked' using twin-screened cable and the auxiliary port connectors.

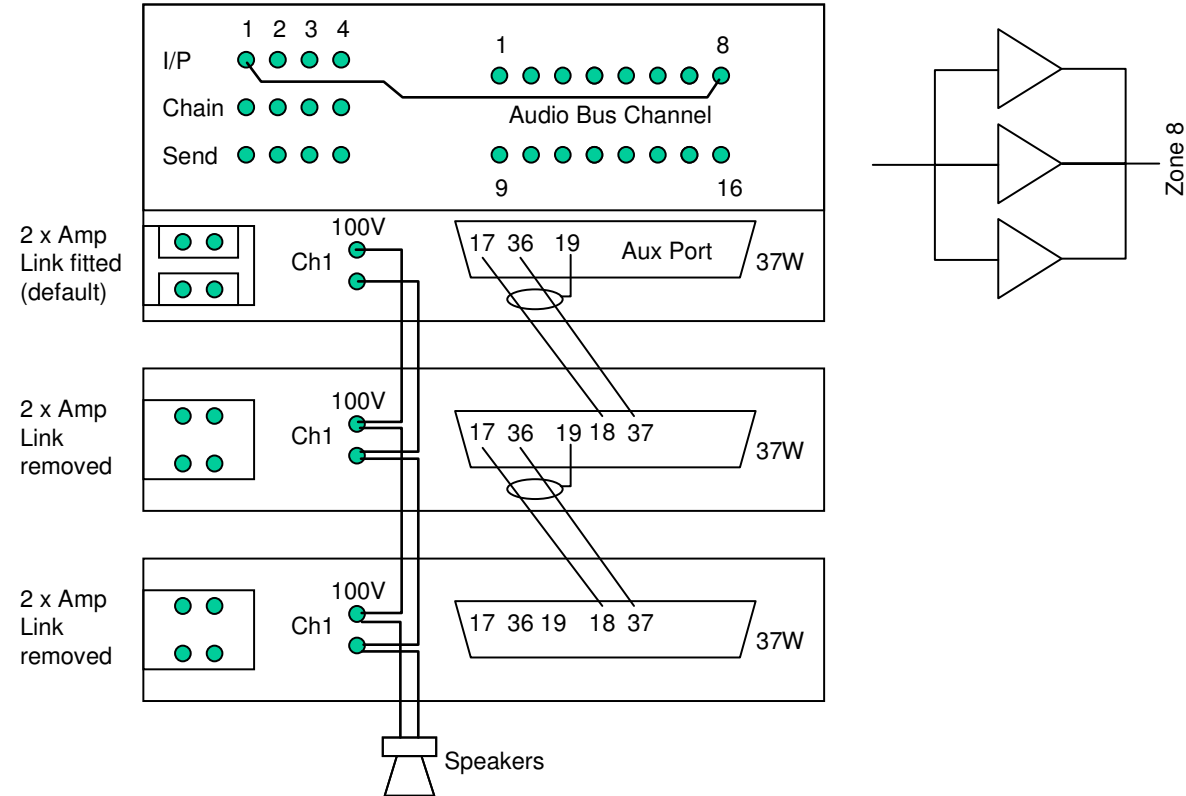
Two signal terminals (paralleled), two return terminals (paralleled) and a screen terminal are provided on the auxiliary port to allow the 'linking' cable to be 'daisy chained'.

Note: The screen of each link cable should only be connected at the source end, the other end should be isolated.

Function	Signal	Return	Screen
Amplifier Link 1	17	36	19
Amplifier Link 2	18	37	N/C

Output Wiring

Output 1 of each amplifier within a group should be connected in parallel to the speaker circuit.



5.4.2 Amplifier Group Controller & Slave Settings

The amplifiers in a group must be configured as:

- Group 'controller' (one only)
- Group 'slave'

Group Controller

One amplifier within a group must be configured as a 'controller'.

Once configured the 'controller' amplifier provides the drive signal to all the other amplifiers within that group.

Channel 1 volume control on the control frame provides signal level adjustment for the entire group.

Group Slave

The remaining amplifiers within the group (other than the single 'controller') must be configured as 'slaves'.

These amplifiers receive their input drive signal from the group controller.

The volume controls for each input channel belonging to the 'slave' group are disabled.

Setting Controller or Slave Configuration

There are two 'Amplifier link' headers located on the D800 control card (see section 4.1)

With links fitted (factory setting) the amplifier is configured as a 'controller'.

To configure the amplifier as a 'slave' to a controller these links should be removed.

5.4.3 Amplifier Group Gain Trim

To provide maximum power output and prevent damage to the group the open circuit gain of each amplifier must be matched to within 0.1Volts.

Method:

- Configure the amplifiers as an amplifier group as described in the previous sections.
- Disconnect amplifier 100V output system cabling.
- Connect a suitable test signal to input channel 1 of the group controller i.e. 0dBu @ 1kHz.
- Check that output 1 of each amplifier within the group (with the volume control set to maximum) is approximately 100V +/- 5 RMS (if not locate and repair problem).
- Measure and note channel 1 output of the group controller to two decimal places i.e. 99.35V.
- Now measure and adjust the second amplifiers output using the trim control located on the D800 control card to within 0.1V of the group controllers output i.e. 99.35V
- Repeat of each amplifier in the group.
- Recheck that the output of each amplifier is within 0.1V of the others.
- With all amplifiers matched reconnect all output cabling and test system.

If possible before connecting the system cabling, load the amplifier group to prove the maximum power output is available.

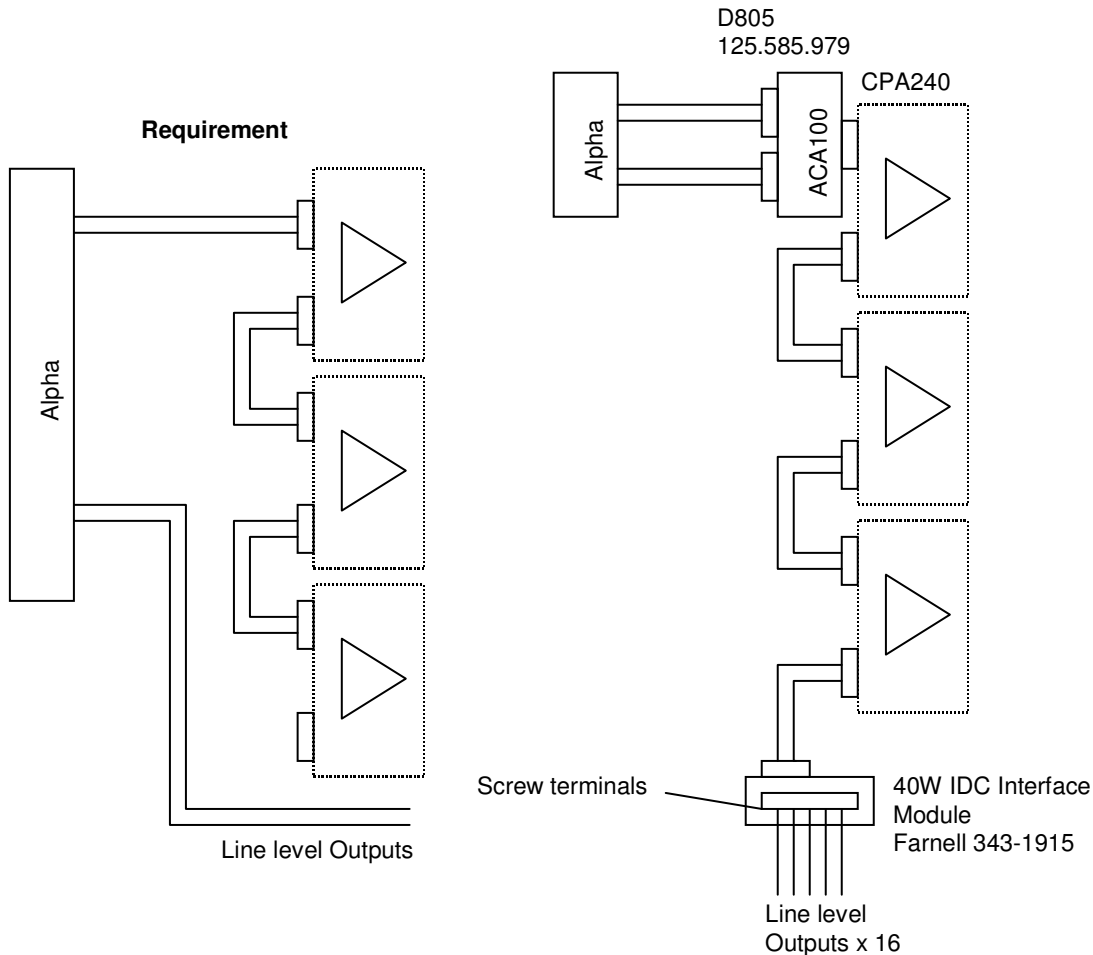
Note: A small drop in the actual power output compared with the calculated output is expected due to losses to the paralleling process.

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5.5 Connecting Line outputs

If CPA240s are used in conjunction with the ACA100 (D805) Adaptor, line level outputs from the Alpha are not easily wired.

To overcome this, a 40W IDC Termination Panel (Farnell 343-1915) can be used after the last amplifier to “break-out” line level outputs. The Termination Panel can be mounted on an ODP panel and field terminals wired direct.



5.6 Amplifier Low Power Idle & Wakeup

In some circumstances the 'low power' mode can affect low level background music reproduction.

To permanently 'wakeup' the amplifier fit the 'Always Wakeup' link.

Warning: Permanently 'waking up' the amplifier will drain battery supplies extremely quickly.

This option must NOT be used on Voice Alarm Systems unless addressed in the system design.

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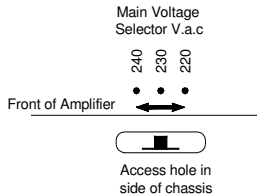
Where an amplifier is used for PA only (not monitored) the amplifier channel fault indications need to be disabled. If this is not carried out the amplifier will display a fault on the front panel.

This modification reduces system monitoring and therefore must not be used on life safety systems. This modification is **ONLY** for amplifiers using D800 Issue B.

6 Mains Voltage Selection

The CPA240 amplifier is provided with a mains voltage selector. This selector allows the amplifier to produce optimum power output without the risk of over temperature shutdown due to excessive heat dissipation.

Note: It is critical that the mains voltage selector is adjusted to the correct setting.



6.1 Setting Mains Voltage Selector

- Using a DVM measure the incoming mains voltage to the amplifier (or equipment rack)
- Set the amplifier voltage selector to nearest resulting position see table
- Repeat setting for all other amplifiers in the equipment rack

Voltage measured	Voltage selector setting
208 - 229	220
230 - 239	230
240 - 253	240

If the voltage selector is incorrectly set the amplifier may shutdown due to excessive heat dissipation or even be permanently damaged. Therefore it is crucial that the selector is set correctly.

7 Fault Monitoring Features

Audix offers the opportunity to monitor the critical audio path of public address and voice alarm systems.

This monitoring is carried out using the Fault Monitoring System or 'FMS'.

The FMS system offers a wide range of monitoring options:

- Audio path.
- Serial data link.
- Control contacts.
- Amplifier.
- Mains and battery supplies

Voice alarm systems that comply with BS5839 Part 8 1998 require all of the above to be monitored on critical paths and components. Critical paths are those paths through the voice alarm system that rely on equipment and the connections between them to achieve a voice alarm broadcast.

As the CPA240 amplifier forms a major part of this path it is therefore a critical component and must be monitored.

Note: If a voice alarm system is to comply with BS5839 Part 8 1998 and any other standard it must be specifically designed to achieve that end.

7.1 Supply Monitoring

The amplifier provides fault monitoring of the primary and secondary power supplies.

- Mains
- Backup supply (24V DC Battery)

Indication of supply failure is in the form of the following front panel LEDs

- Mains supply failure
- Battery supply low voltage/failure
- Charger failure (fault signal from external charger)

Detection of these faults are repeated to the FMS unit.

Indication that 'power' is present from either of the supplies is in the form of a green 'power on' LED.

7.2 Amplifier Monitoring

Further to the supply monitoring the CPA240 provides the following fault monitoring:

- Each power stage
- Over temperature

The power stage monitoring detects the failure of critical power devices by measuring current flow.

Should this 'current flow' be interrupted for more than 100 seconds a channel 'fail' will be displayed on the front panel.

The over temperature indicator denotes that the amplifier has been shut down due to excessive heat in the power block heatsink.

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Although the amplifier will recover once the amplifier has cooled the over temperature indication will remain to inform service personal of its occurrence.
These fault indications are also repeated at the FMS master panel and may be reset by activation of the FMS fault reset.

8 Rack Mounting the CPA240

The amplifier is specifically design to be mounted into 19" equipment racks.

Four fixing points are provided to retain the amplifiers horizontal position.

However the CPA240's weight **must** be supported by some means other than the aluminium front panel. This can be achieved by fixed rails such as the Audix rack runner product 570.507.006 or a sturdy shelf.

The support system **must not** cover the amplifiers ventilation slots and be capable of carrying at least three times the amplifiers weight i.e. 45kg.

With the amplifier in place it should be secured to the equipment rack using four M6 fixing screw or similar.

Please also refer to the 'Safety Considerations' section.

9 Warranty

9.1 Performance

Any performance figures given by the Company are based upon Company experience. The Company will accept no liability if those figures are not obtained unless specifically guaranteed, subject to the tolerance and rejection limits applicable to such figures.

9.2 Delays in Delivery

If delivery is delayed at Customer request the Company reserves the right to increase its price to cover the extra cost of storage, insurance and interest. Interest will be at the rate of 3% above Bank of England base rate per month calculated on a day to day basis for the value of the goods held.

9.3 Storage

Where equipment is stored on site prior to installation, it is the Purchasers' responsibility to ensure the safety and good condition of the equipment. Any damage to equipment on Site shall not prejudice payment by the due date.

9.4 Damage or Loss in Transit (UK)

When the price quoted includes delivery or where this is specifically charged, the Company will repair or replace free of charge goods damaged in transit provided that the Company and the carriers receive written notification within 3 days of delivery. The Company must be informed in writing within 14 days of your receipt of our advice of dispatch if any goods are not delivered.

9.5 Damage or Loss in Transit (Export)

The Company will not be responsible for any loss or damage to goods which occur beyond the point of shipment in the case of F.O.B., F.A.S. and C & F contracts, or beyond the point of delivery stated in the quotation in C.I.F. contracts.

9.6 Liability for Defects

Liability in respect of any defect in or failure of the goods or equipment supplied or for any loss damage or injury attributed thereto is limited to replacement or repair of defective design materials or workmanship, within a period of 12 months of despatch or commissioning. Provided that the commissioning takes place within 6 months after dispatch and PROVIDED THAT such defected parts are promptly returned carriage paid by the Customer to the Company unless otherwise arranged. The right to make a charge for labour, handling expenses and return carriage on the repaired or replacement parts is reserved.

The Company shall be under no liability in contract, tort or otherwise for any personal injury, loss or damage or whatsoever kind of howsoever caused or for anything done or omitted in connection with the goods or equipment or any work in connection therewith.

9.7 Environment

The Company cannot be held responsible for any defects arising from humidity and excessive temperatures.

The products are designed for use at normal room temperatures, typically in the range 15 °C to 21 °C.

9.8 Title of Goods

All items remain property of the Company until payment for the goods is made in full. The Company reserves the right to repossess and paid. Title of goods may not be transferred until all monies owing are paid, full details of our retention of title clause are displayed in our sales office.

9.9 Laws

These conditions shall be governed and construed in accordance with English Law and shall be subject to the exclusive jurisdiction of English courts

10 Safety Considerations

10.1 Safety Considerations for System Design and Installation.

10.1.1 Security

To comply with electrical safety regulations CPA240 amplifier **must** be enclosed in a form of equipment rack or housing that is secure from access by all but trained and qualified personal. Access should be controlled by means of a key or special tools.

10.1.2 Electrical

The electrical installation of which the CPA240 unit is part must incorporate an all-pole mains isolating switch, with contact separation of at least 3mm.

System design must provide adequate protection and insulation of both the mains and amplifier output lines, which may exceed 100V.

The one metre IEC mains power cord supplied with the amplifier **must** be protected by 10A fusing.

Where other types of mains leads are necessary they **must** be BASEC or HAR approved with connectors complying with EN60320.

The lead should also have conductor area at least 0.75 mm² and be rated at 10A.

Careful consideration should be directed towards both the mains supply and distribution system loading, the capacity of which **must not** be exceeded.

The Audix standby battery supply units (Models SBS241, SBS242, or SBS481) all include a separate fuse on each 24V dc output. The fuse rating on the feed to the CPA240 should be 25A fast acting (F 25A)

Where 24V DC standby supply other than Audix range listed are used, The DC feed to the CPA240 should be fused at source with a supply fuse rating of 25A fast acting (F 25A H).

10.1.3 Environmental

During the normal operation of the CPA240 the amplifier can dissipate up to 270W.

The design of the enclosure **must** ensure that adequate ventilation provide so that the internal ambient temperature does not exceed 40°C. Temperatures above this may cause the amplifiers shut down impeding audio output.

A minimum of a 1U space should be allowed above and below each amplifier for cooling.

Where standby batteries are fitted, further consideration to the equipment rack internal ambient conditions should be taken. Battery life is significantly reduced when they are subjected to temperatures above 25°C.

The CPA240 amplifier should not be exposed to dripping or splashing

10.1.4 Installation

Installation of the CPA240 amplifier should be carry out in safe, clean and dry conditions
The equipment rack and supporting floor **must** be stable and able to deal with the significant weight exerted by the public address and voice alarm equipment.

The CPA240 **must** be supported by some means other than the aluminium front panel, this is achieved by fixed rails such as the Audix rack runner product 570.507.006 or a sturdy shelf.

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The support system **must not** cover the amplifiers ventilation slots and be capable of carrying at least three times the amplifiers weight i.e. 45kg.

With the amplifier in place it should be secured to the equipment rack via the front panel mounting holes using four M6 fixing or similar screws.

10.2 Safety Considerations for System Maintenance

Only a qualified and trained electronics engineer should be permitted to make any type of adjustment or repair to the Public Address or Voice Alarm System.

The following safety factors should be considered before attempting to maintain or repair the CPA240.

- Electrical
- Heat
- Weight

During the maintenance process all protective covers **must** be inspected for damage and correct fitment.

10.2.1 Safety and Electrical Rating Information

Information regarding fuse ratings and voltage requirements is provided on the top cover of the amplifier.

The location of high voltage terminals is indicated via British Standard high voltage flash marks on the amplifier chassis.

10.2.2 Electrical Hazards

High Voltages exist within this apparatus:

- 230V mains
- 100V signals

The CPA240 primary supply is 230v AC 50-60Hz. This is connected by means of an IEC fused inlet.

This equipment does not include a mains isolation switch therefore the:

Mains (and battery supply where fitted) must be disconnected from the apparatus before any part of the casing is removed.

Mains and other high voltages can be exposed if internal covers are removed.

100V signals are present both inside the amplifier and at the 100V line output connector.

Adequate precautions must be exercised when working on or around the amplifiers, associated output cabling and terminals.

Battery Backup:

Where the CPA240 has a secondary supply i.e. 24Volt battery backup:

The battery supply must be also be disconnected before any part of the casing is removed.

10.2.3 Heat Hazards.

During normal operation there is a potential temperature hazard in the centre section (heatsink) of the amplifier frame. The CPA240 power amplifier heat sinks can become Very Hot.

This heat can also be conducted through the chassis and other parts.

Heat build-up generally occurs when alarms and other high level signals have been broadcast for a long period of time. Heat build-up may also occur if the amplifier is faulty.

Warning: The amplifier heatsink can reach temperatures of up to 80 °C

10.2.4 Weight Hazards.

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If the CPA240 is to be moved the appropriate lifting code of practice should be followed.
Approximate frame weight in kilograms: 15Kg

Warning: The amplifier frame is heavy!

11 Maintenance

Although the CPA240 requires little or no maintenance the Public Address or Voice Alarm system to which it is installed may require regular scheduled maintenance.

For BS5839 compliant Voice Alarm systems please refer to BS5839 Part 1 (Code of practice for system design, installation and servicing) for recommend maintenance levels.

It is recommended that all members of staff should be urged to report problems with the Public Address or Voice Alarm system (i.e. distortion, speakers not operating, poor coverage) to the department responsible for the maintenance of such equipment.

12 Component Reference Numbers.

Assembly part No.	PCB No.	Description
125.585.974	D800	Control PCB Assy
125.585.975	D801	Output / Heatsink PCB Assy
125.585.976	D802	Power Supply PCB Assy
125.585.978	D804	Connector PCB Assy
125.500.836	N/A	Output / Heatsink Power Block Assy
125.500.837	N/A	Power Supply Assy

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13 Rear panel pin-outs

13.1 Audio Input Bus

Connector – 2 x 40 way IDC header (PCB mounted D804: PL5, PL6)

Note: Signal pairs appear to be in a 'non-standard' configuration. This is due to the Alpha Matrix Controller connector type and orientation.

Function	Signal	Return	Screen
ITP_Wake-up	1	-	-
/Alpha Wake Up	2	-	-
Input Bus Channel 1	33	34	-
Input Bus Channel 2	31	32	-
Input Bus Channel 3	29	30	-
Input Bus Channel 4	27	28	-
Input Bus Channel 5	25	26	-
Input Bus Channel 6	23	24	-
Input Bus Channel 7	21	22	-
Input Bus Channel 8	19	20	-
Input Bus Channel 9	17	18	-
Input Bus Channel 10	15	16	-
Input Bus Channel 11	13	14	-
Input Bus Channel 12	11	12	-
Input Bus Channel 13	9	10	-
Input Bus Channel 14	7	8	-
Input Bus Channel 15	5	6	-
Input Bus Channel 16	3	4	-

13.2 Audio Outputs

Connector - 10 way in-line socket (PCB mounted D804: PL9).

Function	Signal name	Signal	Return
Amplifier Channel 1 Output		1	2
Amplifier Channel 2 Output		3	4
Amplifier Channel 3 Output		5	6
Amplifier Channel 4 Output		7	8
Future connection	FMS_OVR	9	-
Chassis Earth.	CHS	10	-

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13.3 FMS Bus

Connector – 2 x 16 way IDC header (PCB mounted D804: PL1, PL2)

Function	PL1 (from FMS bus terminator)	PL2 (To FMS)	Signal
Cable monitoring daisy chain	1	-	NC(IN)
Cable monitoring daisy chain	2	-	NO(IN)
Cable monitoring daisy chain	-	1	NC(OUT)
Cable monitoring daisy chain	-	2	NO(OUT)
Reserved for future development	3	3	FM+
Reserved for future development	4	4	FM-
spare	5	5	spare
Watchdog fault bus.	6	6	/WF
Memory/Misc. fault bus.	7	7	/MF
Amplifier fault bus.	8	8	/AF
Power Input (Mains) fault bus.	9	9	/PF
Surveillance (Speaker Line) fault bus.	10	10	/SF
Battery fault bus.	11	11	/BF
Accept / Test mode control bus.	12	12	/AC
Watchdog Pulse (New Watchdog) bus.	13	13	/WP
New Fault bus.	14	14	/NF
FMS_COM (IN)	15,16	-	FMS_COM(in)
FMS_COM (OUT)	-	15,16	FMS_COM(out)

13.4 Auxiliary Port (Channel Inserts)

Connector - 37 way 'D' skt (PCB Mounted D804: PL4)

Function	Signal	Return	Screen
Common (overall screen)	-	-	1
Channel 1 Send	2	21	20
Channel 1 Return	3	22	4
Channel 2 Send	5	24	23
Channel 2 Return	6	25	7
Channel 3 Send	8	27	26
Channel 3 Return	9	28	10
Channel 4 Send	11	30	29
Channel 4 Return	12	31	13
/ALPHA_WAKEUP	32		
/AMP_FAIL_1	14		
/AMP_FAIL_2	33		
/AMP_FAIL_3	15		
/AMP_FAIL_4	34		
ITP_WAKEUP	16		
n.c.	35		
Amplifier Link (for paralleled group)	17,18	36,37	19

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13.5 Back-up Supply Connector Schematic

A 24V DC backup supply can be connected to the amplifier frame to provide supply redundancy.

The amplifier is supplied with a mating 'free' connector that should be wired as shown below.

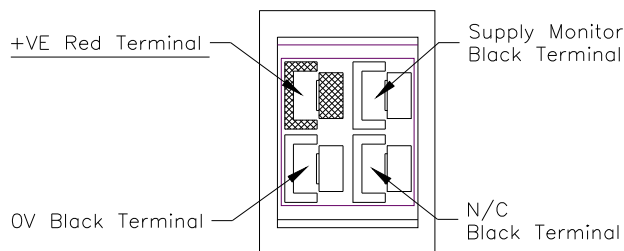
The connector will accept cable cross-sections up to 4mm².

The +ve and 0V supply cables should be designed to take a minimum of 20A continuously.

The supply monitor terminal provides a means for the amplifier to detect the failure of the backup supply charger. Where fitted the supply monitor cable may be equivalent to 16/0.2.

Note: The backup supply must be fused to 25A

Amplifier Chassis Back-up Supply Connector
(View from rear of CPA240)



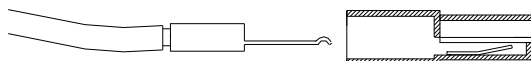
Battery Connector Wiring and Assembly Details

The battery connector is supplied in kit form.

Parts supplied are as follows:

- 4 off contact crimps.
- 1 off red contact socket
- 3 off black contact sockets
- 1 off shell with strain relief and roll pin

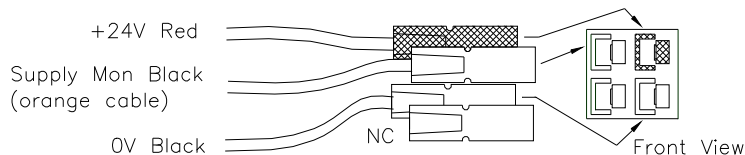
Cables and battery supply connector are not supplied



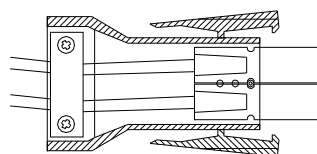
1. Strip each cables insulation by 7mm
2. Fit and crimp contacts on to cables



3. Slide the 'red' cables contact into the red contact socket.
Check the crimp 'clicks' into place
4. Repeat with 'black' and 'orange' cables using the black contact sockets
5. Fit unused contact crimp into the remaining contact socket



6. Assemble the contact sockets by sliding them together in the order shown
Correct positioning is critical

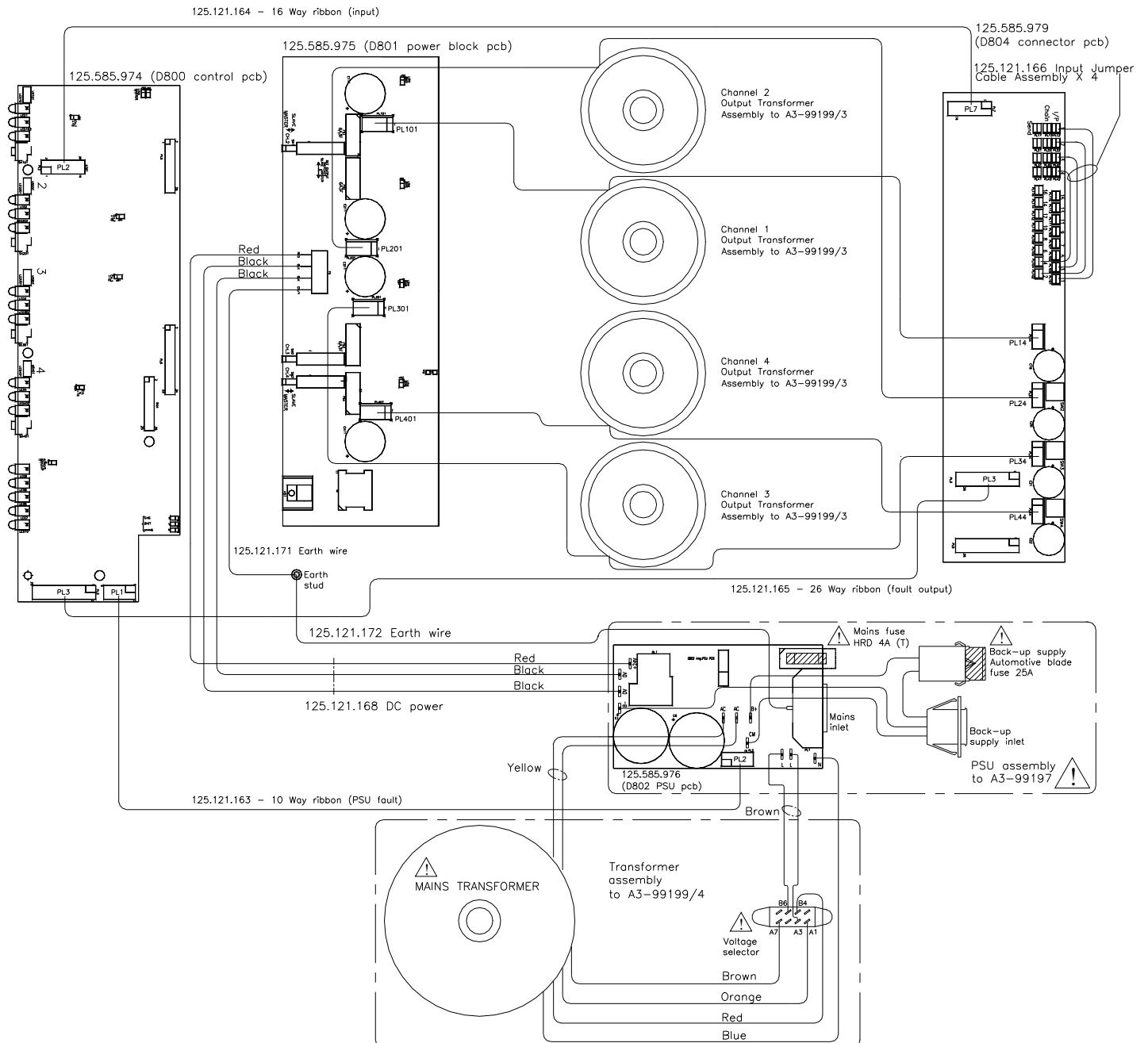


7. Feed the shell over the cables.
8. Position shell so that the hole in the contact shell block aligns with the first roll pin hole (adjacent to edge of shell)
9. With both the contact block and shell aligned press roll pin into position.
10. CHECK ORIENTATION OF CONTACT SOCKETS
11. Fit strain relief

CPA240 Configurable Power Amplifier

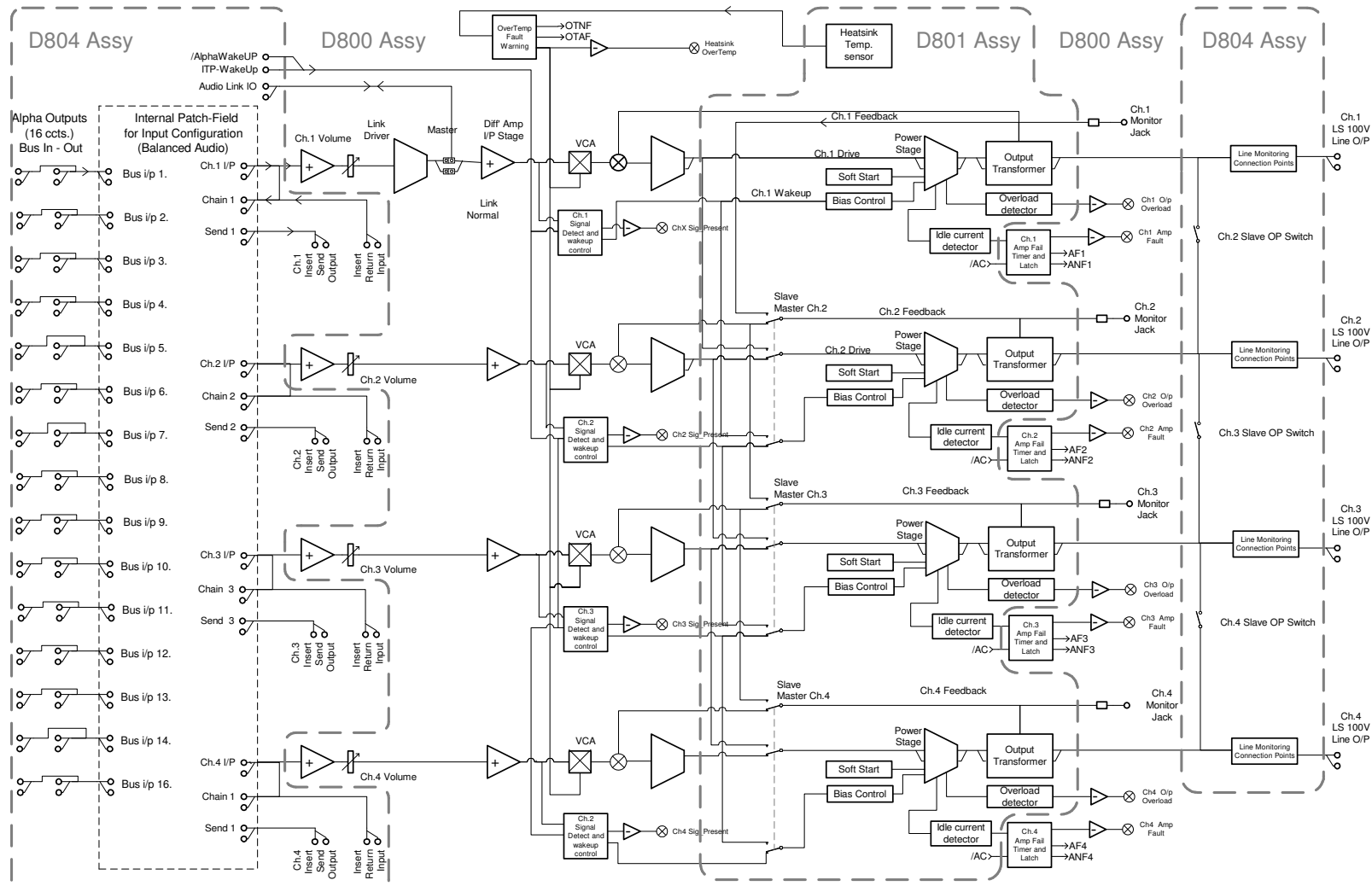
14 Electrical Schematic

The following diagram shows internal connections with safety critical components and assemblies marked.



CPA240 Configurable Power Amplifier

15 Detailed Block Diagram



APPENDIX A

Amplifier Fail Disable (PA Only)

Where an amplifier is used for PA only (not monitored) the amplifier channel fault indications need to be disabled. If this is not carried out the amplifier will display a fault on the front panel.

This modification reduces system monitoring and therefore must not be used on life safety systems. This modification is ONLY for amplifiers using D800 Issue B.

To disable the amplifier channel fault indications a link wire can be connected between J4 pin 1 and J5 pin 2 on the D800 amplifier control PCB. This modification disables the channel fault timeout and therefore the channel fault indicators.

